Urban Transportation Systems
CEVE 452

8:00 - 9:15 a.m. Tuesday - Thursday

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Transportation is probably the biggest driver of the shape of our cities. Cities exist because they are the best mechanism humans have developed for bringing people together. The more people meet, the more they develop ideas, grow organizations, build culture, and trade.

Cities developed as we went from designing for pedestrians to designing for trains and streetcars to designing for cars. Now, the shape of cities is evolving again as we try to design “complete streets” that accommodate pedestrians, bikes, and transit. All of this is a continuing discussion between engineers, planners, and architects. Engineers take the lead in designing transportation, but you cannot design good transportation infrastructure without thinking of planning, architecture, and urban design.

The key to understanding any mode of transportation is understanding its geometry. The geometry of trains — their length, the curve radii and grades they require — drove the design of the Victorian city. The geometry of cars — lane widths, intersection layouts, and highway grade separation — drives the design of today’s cities. On a large scale, transit depends on the geometry of networks and connections. The design standards, like the AASHTO Green Book, that set this geometry are essentially the DNA of the urban landscape

We cannot understand transportation with being comprehensive in terms of modes: roadways, pedestrians, bikes, transit, planes, shipping, freight as well as passengers. That includes thinking about how these modes interface and work with one another, since that's increasingly the way the world works. A container going from a factory in China to a warehouse in Texas moves from truck, to ship, to truck, to train, to truck, but to the shipper, it's all one supply chain.

In this semester, we will look at the history of transportation modes in the context of the history of cities. We'll look at how we conceive and implement transportation infrastructure. We'll visit some local transportation infrastructure. But, this is at heart a design class. It's not possible in a semester to become a traffic engineer. It is possible to learn enough about roadway design to, given a specific right-of-way width, come up with a few alternate cross sections for a road and analyze the pros and cons of each. It is possible to learn enough about how a rail station works to lay out a set of tracks and platforms and think about how to fit them into a city.

Class Outline

- Introduction: Transportation and Cities
- Pedestrians
- Bicycles
- Cars and Trucks
- Trains
- Transit Networks
- Ships
- Planes
- Conclusion: Engineers, Planners, and Architects

Upon completion of this sequence, a student is expected to:

- Understand the fundamental characteristics of the most common transportation modes
- Understand the role different transportation modes serve today
- Understand how the design of transportation systems shapes cities
- Be able to do "back of the envelope" sketch designs for pedestrian, bicycle, and car infrastructure and for transit networks
- Be aware of the systems by which transportation projects are designed, funded, built, maintained, and operated in the United States.

Owlspace and E-mail

Class schedules, assignments, and announcements will be posted on Owlspace. Students are expected to check Owlspace for updates. All students are expected to check their Rice e-mail accounts. Individual communications may come through e-mail.

Grading

Class grade is based on:

- Assignments (30 %)
- Final Project (30 %)
- Exam (30 %)
- Attendance (10 %

The grading scale is as follows:
97% or above: A +
93%-96.9%: A
90%-92.9%: A-
87%-89.9%: B+
83%-86.7%: B
80%-82.9%: B-
77%-79.9%: C+
73%-76.7%: C
70%-72.9%: C-
67%-69.9%: D+
63%-66.7%: D
60%-62.9%: D-
59.9% or below: F
This range may be adjusted downwards, but not upwards.

Assignments
There will be homework assignments through the semester. Assignments will include writing, graphic documentation, and presentation. For assignments that include presentations, not all students will present for every assignment, but each student will present at least once during the semester. Assignments will be graded for writing and presentation, as well as content.

Exam
The exam will be based on lecture content. It will include short answer and essay questions. The lecture slides shown in class will be posted for exam review, and a review exam (with different questions than the exam) will be posted as well. The exam is on Owlspace; it is a take-home and can be taken any time between the last day of class and the end of finals period.

Final Project
A final project will be assigned midway through the semester and due at the end of the semester.

In-class Design Exercises
Group design activities will be scheduled during the regular class time.

Field Trips
Field trips will be scheduled outside of the regular class time. Since the scheduled time may not work for everyone, alternate activities will be provided for students who cannot attend the field trips. Attendance at a field trip or completion of an alternate assignment will earn extra credit equal to 1% of the class grade.

Attendance
The attendance portion of the class will be graded as follows:
3 or fewer absences - full credit
5 or 6 absences - 50% credit
more than 6 absences - no credit

Accommodations may be made for illness or academic-related absences. If you will miss class for these reasons, e-mail both of us with “absence” in the subject line before class starts. It will be difficult to do well on the exam without attending the lectures. Any student who will miss a class can contact us for alternatives.

Honor Code
The extent of collaboration permitted on each assignment, project, and exam will be indicated with that assignment, project, or exam.

Accommodations for Disability
Any student with a documented disability seeking academic adjustments or accommodations is requested to speak to the instructor during the first two weeks of class. All such discussions will remain as confidential as possible. Students with disabilities will need to also contact Disability Support Services in the Allen Center.

Contact Information
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We have no standing office hours and no on-campus office, but we are happy to schedule appointments on campus.

Prerequisites
This class is open to students of any major. There are no prerequisites.

Textbook
The following texts are assigned for the class:

- “Walkable City: How Downtown Can Save America, One Step at a Time,” Jeff Speck, 2013 (http://amzn.com/0865477728)
- “Divided Highways: Building the Interstate Highways, Transforming American Life,” Tom Lewis, 2013 (http://amzn.com/0801478227)
- “Human Transit: How Clearer Thinking about Public Transit Can Enrich Our Communities and Our Lives,” Jarrett Walker, 2011 (http://amzn.com/1597269727)
- “The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger,” Marc Levinson, 2008 (http://amzn.com/0691136408)

Texts may be purchased on Amazon in paper or e-book format.